

SOCIETATIS METEOROLOG. PALATINAE. 11

○ significat coelum ex omni parte serenum, quo tamen in statu si pallidior solis stellarumve lux fuerit, huic signo crux adjungitur (○+);
 = = coelum totum nubibus tectum,
 ☱ nubes majori coeli parti inductas, sive continuae sint, sive disjunctae & quasi pertusae,
 = coelum nubes inter & caeruleum colorem ex aequo divisum,
 = nubes rariores, quae minorem coeli partem occupant,
 & nubes rarissimas, hinc inde dispersas.

Nubium color, forma & moles initialibus nominum literis exprimuntur. Sic litera

a significat albus,	l luteus,
cin. cinereus,	n niger,
fasc. fasciae (nubes in longas efformatae fascias, quarum directio indica-	r ruber,
tur),	sp. spissus,
	t tenuis,
	rup. rupiformis (rupi similis).

Qui speciales de forma & coloribus nubium observationes instituerit, is opus perutile & magni momenti faciet.

X. Etiam extra consuetas observandi horas notantur omnia meteora & phaenomena memoratu digna, cuiusmodi sunt pluvia, nix, grando, pruina, nebula, tempestates fulmineae, procellae, aurorae boreales, lux horizontalis, irides, terrae motus, fracturae nubium, columnae aquae, halones, parelii, paraseleneae, globi ignei &c. His ea signis distinguntur:

:: indicat pluviam,	.. iridem,
:: nivem,	◎ halonem lunae,
:: grandinem,	◎ halonem solis,
:: pruinam, quae si nebulam constringit, eam- que ramis arborum, crinibus &c. affigit,	○--○ parelium,
signo huic litera n additur;	●--● paraselene,
:: nebulam,	♂ tempestatem, sive fulgur & tonitru conjuncta sint, sive alterutrum tantum habeat locum;

AB auroram borealem,

cetera suis quaque nominibus scribuntur. Sicui horum meteororum eminens quidam gradus convenerit, id apposito asterisco (*) designatur. Sic :: * pluviam largissimam, ♂* tempestatem violentam & atrocem significat, & ita porro; & tunc non modo tempus initii sed & finis meteori annotatur. Apparente meteoro insigni & rariore, v. gr. aurora boreali, vehementer procella &c., etiam altitudo barometri, thermometri & hygrometri, una cum directione venti & declinatione acus magneticae, observatur.

TABLE 1.—*International Meteorological Symbols.*

Symbol.	Principal variants.	Meaning.	Remarks.
●	●	Rain.	
*	*	Snow.	
☒	☒ ☐	Thunderstorm.	The symbol represents a snow-crystal, and should therefore be 6-pointed. The 8-point star is given in the English and Spanish editions of the Codex.
⊤	⊤	Thunder.	Without lightning.
⚡	⚡ ⚡	Lightning.	Without thunder; "heat-lightning."
▲	▲	Hail.	
△		Soft hail.	Ger., <i>Graupel</i> ; Fr., <i>grésil</i> . Resembles little snow-pellets.
≡	≡	Fog.	The variant ≡ was used by the British Meteorological Office until 1912 and appears in the English edition of the Codex.
≡	≡	Ground fog.	Not exceeding the height of a man.
≡:	≡: ≡:	Wet fog.	One which wets exposed surfaces.
└	└ ↘ ↙	Hoarfrost.	
▷	▷ ▷ ▷	Dew.	The inverted symbol has been used at the Observatory of Nuestra Señora del Recuerdo (Madrid). The Observatory of San Fernando (Spain) uses the ordinary symbol for dew (<i>rocio</i>), and the inverted symbol for evening dew (<i>rclente</i>).
▽	▽ See remarks.	Rime.	A rough frost deposit from fog. The inverted symbol △ was formerly used at Zikawei Observatory. The Observatory of San Fernando (Spain) uses ȳ and ȳ, to denote rime deposited in calm and windy weather, respectively. (Cf. Rept. Int. Met. Conf., Innsbruck, 1905, Engl. ed., p. 81.)
⌚	⌚ ⌚ ⌚	Glazed frost.	Ice coating due to rain, "ice-storm." In America often called "sleet."
➔	➔	Driving snow.	Ger., <i>Schneegestöber</i> ; Fr., <i>bourrasque de neige</i> .
←	← ↗ ↘	Ice-crystals.	Ice-needles sometimes seen floating or slowly falling in the air in clear, cold weather.
☒		Snow on ground.	Ground near station more than half covered.
☴	☴ See remarks.	Gale.	Wind of force 8-12, Beaufort scale. (Rept. Int. Met. Comm., Berlin, 1910, English ed., p. 17). Formerly used for "strong wind." A 3-barbed arrow is introduced in the 2d German ed. of the Codex to denote "strong wind," but no authority is cited. According to the Observer's Handbook, "the number of barbs on the arrow may conveniently be made to represent the strongest wind force noted," but there is no international sanction for such variants.
○		Sunshine.	In German edition of Codex, but has never been definitely recognized by the international organization. (See Rept. Int. Met. Comm., Southport, 1903, Engl. ed., p. 19 and 101). Widely used in German and Austrian publications.
⊕	⊕	Solar halo.	
⊖	⊖	Solar corona.	
☽ ☽ ☽	☽ ☽ ☽	Lunar halo.	
☽ ☽ ☽ ☽	☽ ☽ ☽ ☽	Lunar corona.	
⌒		Rainbow.	
₩ ₩ ₩	₩ ₩ ₩	Aurora.	
₩ ₩ ₩	₩ ₩ ₩	Zodiacal light.	
∞		Haze.	Due to fine dust, or to the disturbance of atmospheric transparency by air-currents of different densities ("optical turbidity"), and not to water-drops. In practice, this is often difficult to distinguish from light fog (≡), or "mist" of British observers. Prussian and Austrian observers underscore this symbol (∞) to denote a definitely smoky atmosphere ("Moorrauch"). The Observatory of the Agronomic Institute of Moscow uses ∞ for dry fog, and [∞] for haze.

NOTE.—Since the preparation of the above table the Weather Bureau has adopted the name "glaze" for the English "glazed frost" (Glatteis, verglas). Concerning "sleet" see p. 285.

No action was taken in regard to these discrepancies until 1891, when the International Meteorological Conference at Munich decided in favor of the German series. In the meantime, however, the symbols as given in the French and English versions of the Vienna *procès-verbaux* had been incorporated in the official instructions of numerous meteorological services, and both the French and the English series have been widely used down to a recent time.

2. A circular issued by the Weather Bureau January 1, 1894, states in connection with the symbol \rightarrow :

This symbol indicates that strong winds are raising the snow from the ground, filling the air with it like dust, and transporting it horizontally; this may occur under a clear sky. The symbol does not refer to snow falling from the clouds, nor to the mere fact that the snow is lying in drifts on the ground.

This statement is repeated in subsequent Weather Bureau publications and in Smithsonian Meteorological Tables, 2d ed., 1897, p. 265. On the other hand, the Prussian and Austrian official instructions to observers prescribe that this symbol shall *not* be used for snow that is merely blown from the ground.⁴ Moreover, the German and French official designations of the symbol are "Schneegestöber" and "bourrasque de neige" (or "tempête de neige"), respectively, both of which usually imply the fall of snow from the clouds in connection with a windstorm. It appears, therefore, that there is no international authority for the American definition given above, which probably owes its origin to the use of the ambiguous term "snow-drift" in the English version of the report of the Vienna congress. In practice, however, when the air is filled with driving snow it is sometimes impossible to determine whether any part of it is falling from the sky.⁵

3. The symbol \triangle is defined as "sleet" in Smithsonian Meteorological Tables, 2d and 3d editions (1897, 1907), and in several publications of the Weather Bureau. Although the term "sleet" admits of various meanings, it is not properly applicable to the definite form of precipitation known as "soft hail," or "graupel," for which the above symbol was prescribed by the international organization.⁶ [See p. 281, ffg.]

⁴"Unter Schneegestöber (\rightarrow) ist ein Schneefall bei lebhafteren Winden, welche die Schneeflocken durchmäander wirbeln, zu verstehen. Wird bereits lagernder Schnee vom Erdboden emporgewirbelt oder fortgeweht, so ist dies nicht als Schneegestöber (\rightarrow), sondern als Schneestreifen zu bezeichnen."—K. Preuss. Met. Inst., "Anleitung zur Anstellung und Berechnung meteorologischer Beobachtungen," 2d ed., 1904, pt. 1, p. 36.

⁵A number of special symbols for discriminating between different conditions under which the air may be charged with snow were used by Westman in the observations made in Spitsbergen by the Swedish expedition of 1899-1902. See J. Westman, "Observations météorologiques faites en 1899 et 1900 à la baie de Treurenberg, Spitzberg" (Stockholm, 1904), p. 32-33.

⁶Since about 1897 the Weather Bureau has applied the term "sleet" only to small particles of clear ice, falling with or without rain or snow. There is no international symbol for this form of precipitation. In the United States the word "sleet" is often applied to the ice coating due to falling rain ("glazed frost" of British usage). In Great Britain "sleet" commonly means a mixture of raindrops and snowflakes.

Exponents.—An exponent added to a symbol indicates the degree of intensity, ranging from ⁰ weak (light, etc.) to ² strong (heavy, etc.). Thus, \circ^0 , light rain; \circ^2 , heavy rain. German and French observers use the exponent ¹ to denote medium intensity, in accordance with the German and French versions of the report of the Vienna congress, and the German editions of the Codex. The English version of the above-mentioned report and the English edition of the Codex provide for the use of only two exponents, ⁰ and ²; hence in English-speaking countries the omission of the exponent indicates medium intensity.

Time of occurrence.—When hours of occurrence are added to symbols, the abbreviation *a* is used for a.m., and *p* for p.m. Thus, $\circ 10a-4p$ denotes "rain from 10 a.m. to 4 p.m." The abbreviation *n* means "during night". Stations taking tri-daily observations may use *a* to mean between the first and second observation; *p*, between the second and the third; and *n*, between the third and the first.

III. OTHER SYMBOLS.

The following symbols differing either in form or meaning from the International Symbols are found in the literature of the 19th and present centuries. In view of the indefiniteness of many of the meteorological terms used in connection with these symbols, the explanations of the symbols are given in the original languages.

A. SYMBOLS USED IN METEOROLOGICAL REGISTERS.

Austria-Hungary.

Austria-Hungary. K. K. Hydrographisches Amt S. M. Kriegsmarine zu Pola. Jahres-Übersicht der meteorologischen Beobachtungen, 1874. (The first two of these symbols are given also in Jelinek's "Anleitung zur Anstellung meteorologischer Beobachtungen," Wien, 1869, p. 63.)

- Nebel.
- ⋮ Regen.
- ↓ Gewitter.
- ↑ Blitz.

Canada.

Canada. Meteorological service. Instructions to observers. Toronto. 1878. p. 175.

⊕ Overcast, the whole sky being covered with impervious cloud.

◎ Clearing weather.

ℳ Misty, caused by condensed vapor.

↓ Flurries of snow.

▽ "Visibility" of distant objects.

(Recognized by U. S. Signal Service in 1883. See note under *United States*.)

Chile.

Chile. Instituto central meteorológico y geofísico. Anuario meteorológico, 1912. Santiago de Chile. 1914. p. vii.

☰ Llovizna, garúa.

☰ blina de montaña.

◻ Relámpagos de calor, (de cordillera) resplandores eléctricos silenciosos.

≡ Luz zodiacal.

Denmark.

Holten, C. Tables météorologiques de Copenhague, publiées sous les auspices de l'Académie royale danoise des sciences, 1866-1874. Copenhague.

○ Klar.

⊗ Blandet.

● Mørk.

France.

Montsouris. Observatoire physique central. Bulletin mensuel, 1872. Paris. 1875. tome 1. p. 386-387.

○ Ciel beau, sans nuages ou très-peu nuageux.

◐ Ciel peu nuageux, au quart couvert de nuages.

◑ Ciel nuageux, à moitié garni de nuages.

● Ciel très nuageux, aux trois quarts couvert.

● Ciel couvert, aux quatre quarts couvert.

◐ Brouillard durant toute la journée. Brouillard persistant.

○ Vapeurs, brouillard se dissipant dans le jour, brumes à l'horizon.

◊ Rosée.

△ Gelée blanche.

▲ Gelée, glace.

▷ Orage sans pluie.

▷ or ▷ Orage avec pluie.

■ Grêle.

□ Grésil.

▣ Vent du sud.

▢ Vent du sud-ouest.

▢ Vent de l'ouest.

▢ Vent du nord-ouest.

▢ Vent du nord.

▢ Vent du nord-est.

▢ Vent de l'est.

▢ Vent du sud-est.

▢ Vent nul ou très-faible.

▢ Vent faible.

▢ Vent modéré.

▢ Vent assez fort.

▢ Vent fort.

▢ Vent très-fort.

▢ Vent violent.

Carlier, H. Observations météorologiques faites à Saint-Martin-de-Hinx, France (Landes), du 1 décembre 1875 au 30 novembre 1878. Bayonne. p. 2.

▲ Grêle.

Germany.

Jena. Grossherzögliche Sternwarte. Meteorologisches Jahrbuch, 1835, p. 1.

○ Ganz heiter.

○ Heiter.

□ Schön.

△ Wolkig.

≡ Trübe.

Ganz trübe.

•• Thau.

** Reif.

† Nebel.

● Regenhaft.

* Einzelne Schneeflocken.

:: Regen.

※ Regen mit Schnee.

ஃ Graupeln.

∞ Schlossen.

● Strichregen.

∷ Landregen.

† Wetterleuchten.

✗ Blitz.

✓ Donner.

✗ Blitz und Donner.

✓ Sternschnuppen.

○ Feuerkugeln.

⌚ Morgen- oder Abendroth.

⌚ Wiederschein.

⌚ Regenbogen.

⌚ Mondkrone.

⌚⌚ Höfe um Sonne oder Mond.

○○ Nebensonnen.

⌚⌚ Nebenmonde.

⊖ Wärme im Sonnenschein.

Württemberg. K. meteorologische Zentralstation. Deutsches meteorologisches Jahrbuch. Stuttgart. (Current issues.)

Ϝ Lebhafter wind.

India.

India. Meteorological department. Instructions to meteorological observers in India, by Henry F. Blanford. Calcutta. 1876. p. 59.

⌚ Dust whirl or "devil."

⌚ Dust storm.

Ϝ Hot wind.

Japan.

Japan. Central meteorological observatory. Monthly report. (Current issues.)

⌚ Earthquake.

Netherlands.

Netherlands. Meteorologisch instituut. Meteorologische waarnemingen. Utrecht. (Issues previous to 1877, at about which time the international symbols were adopted.)

- Helder.
 - Ligt bewolkt.
 - Bewolkt.
 - Zwaar bewolkt.
 - Betrokken.
 - Mist.
 - Dauw.
 - Donder.
 - Weerlicht zonder donder.

Russia.

Russia. Observatoire physique central Nicolas. Annales. Petrograd.

In current issues:

- Pluie de glace. (Also used by the Meteorological Bureau of the Amur.)
 - Colonnes lumineuses près du soleil. (This symbol is in general use in Russia.)

In early issues, prior to the introduction of international symbols:

- 8 Thau.
 ● Reif.
 △ Duft. Rauhfrost.
 ▲ Glatteis.
 ○ Nebel (oder Dunst in der Höhe)
 □ Graupeln, Riesel.
 ■ Hagel.
 ⚡ Blitz.
 ○ Sonnenhof.
 ⚡ Mondhof.
 ⚡ Nordlicht.
 ➔ Starker Wind.
 ⚡ Erdbeben.
 ⚡ Grêle.
 ⚡ Eclairs.
 ☩ Tonnerre.
 ☩ Tonnerre et éclairs.
 ○ Serein.
 ☽ Couvert.
 ☽ Nuageux.
 ☽ Nuages disséminés.
 ☽ Nuages à l'horizon.
 ☽ Nuages legers.
 ☽ Nuages legers à l'horizon.
 ☽ Quelques nuages isolés.

Spain.

Granada. Observatorio meteorológico de Cartuja.
Boletín anual. (Current issues.)

- Bruma o niebla en el río.
 ○ Cielo despejado.
 ◉ Cielo $\frac{1}{2}$ cubierto.

- Cielo $\frac{1}{2}$ cubierto.
 - Cielo $\frac{3}{4}$ cubierto.
 - Cielo cubierto.
 - Cielo cubierto con llovizna.

(The second, fourth and sixth of these symbols are also used by the Observatorio del Ebro.)

United States.

Formerly used by the Iowa Weather Service:

- ⚡ Thunderbolt. Lightning striking any object on the earth. (Adopted about 1877.)
 - ⚡ or TB Thunderbolt. A flash of lightning having struck an object on the earth's surface, a tree, house, animal, etc., it is designated either by duplication of the symbol of lightning or by TB. (Adopted 1878.)
 - ⌚ Zodiacal light. (Adopted 1878.)
 - ☄ Shooting star. (Adopted about 1877.)
 - ☄ Meteor, fireball. (Adopted about 1877.)

NOTE: In 1883 the U. S. Signal Service authorized the use by voluntary and State weather service observers of a set of symbols, comprising several of the International Symbols, the above symbol for zodiacal light, and the five symbols shown above under *Canada*. (U. S. Signal office, Circular No. 16, Oct. 18, 1883.)

Miscellaneous.

Kaltbrunner, D., & Kollbrunner, E. Der Beobachter. Allgemeine Anleitung zu Beobachtungen über Land und Leute, für Touristen, etc. 2.Aufl. Zürich, 1888. Taf. 21: "Meteorologische Zeichen."

- Abendthau.
 - Morgenthau.
 - ≈ Dünste.
 - ≡ Leichter Nebel.
 - ≡ Starker Nebel.
 - ≡ Leuchtender Nebel.
 - ≡ Duftender Nebel.
 - Schwacher Regen.
 - Stark Regen.
 - ≈ Wolkenbruch.
 - ↗ Schneesturm.
 - ! Elektrisches Tosen.
 - ↓ St. Elmsfeuer.
 - ⚡ Blitzschlag.
 - ↑ Luftspiegelung.
 - ⌒ Doppelter Regenbogen.
 - օ or ⊕ Sonnenhof.
 - օ or ↗ Mondhof.
 - օ Nebensonnen.
 - օ Nebenmonde.
 - օ or Ⓛ Sonnenkrone.
 - օ or ↘ Mondkrone.
 - ⏝ Sturm.
 - ⟳ Wirbelwind.
 - Z Windhose, Wasserhose.
 - ◎ Cyclone.

B. SYMBOLS USED ON WEATHER MAPS.

Wind Arrows.

On all weather maps the direction of the wind is shown at each station by an arrow which flies with the wind.

As a rule the force of the wind is indicated by the number of feathers or tails attached to the arrow, according to the Beaufort or some other scale of wind force. On several European maps the force of the wind on the Beaufort scale is shown by means of feathers and half-feathers, thus: \swarrow , force 1; \nearrow , force 2; \nwarrow , force 3; etc. On the United States and Canadian maps the wind force is not indicated by symbols, but is given in miles per hour in the tabular portion of the map. On the Mexican weather map the force of the wind is shown by arrows as follows: \rightarrow débil; \rightarrow moderado; \rightarrow algo fuerte; \rightarrow fuerte; \rightarrow violento; \rightarrow huracán.

Calm (absence of wind) is usually indicated merely by the omission of the arrow, but a few special symbols for calm have been used; viz., \odot , \odot , X , and C .

Symbols for Cloudiness.

The state of the sky with reference to cloudiness is usually indicated by the use or omission of shading inside a circle. Two principal systems have been used, as follows: \odot clear; $\odot \frac{1}{4}$ cloudy; $\odot \frac{1}{2}$ cloudy; $\odot \frac{3}{4}$ cloudy; \bullet cloudy; or \odot clear; \odot partly cloudy; \bullet cloudy.

Various special symbols for cloudiness and other meteorological conditions are shown below.

Miscellaneous Symbols.

AUSTRIA-HUNGARY.

- ⋮ Pioggia. (Triest.)
- ⋮ Regen. (Vienna.)

BELGIUM.

- ⦿ Pluie.
 - ⊕ Neige.
 - ⊖ Brouillard.
- In current use.

- ☀ Serein.
 - ▣ Pluie.
 - Neige.
 - Brume.
 - Brouillard. (Later ⦿.)
 - ⚡ Orage.
 - Hausse barométrique.
 - Basse barométrique.
 - ⦿ Baromètre stable.
- In earlier use.

CANADA.

- Ⓐ Rain.
- Ⓐ Snow.
- Ⓜ Report missing.

CHINA.

- | | |
|-------------|--------------|
| ⦿ Orkan. | } Tsingtau. |
| ○ Regen. | |
| ○ Fair. | } Zi-ka-wei. |
| ● Cloudy. | |
| ① Drizzle. | |
| ○ Overcast. | } Squally. |
| ◻ Showers. | |

EGYPT.

- ≡ From 0 to 4.9 mm. of rain (previous 24 hours).
- ||| From 5 to 9.9 mm. of rain (previous 24 hours).
- |||| More than 9.9 mm. of rain (previous 24 hours).

FRANCE.

- | | |
|----------------------|---|
| ○ Beau. | } In current use in France and Algeria. |
| ⦿ Nuageux. | |
| ● Couvert. | |
| ⊖ Brumeux. | |
| ⊕ Brouillard. | } In earlier use in France. |
| ≡ 0 à 5 mm. (pluie). | |
| 5 à 10 mm. (pluie). | |
| au dessus de 10 mm. | |

GERMANY.

- | | |
|----------------------------------|--------------------------------|
| ☒ Telegramm fehlt. (Munich map.) | } Dresden map—tabular portion. |
| ☒ Regen. | |
| ☒ Schnee. | |
| ⦿ Anhaltend Sonnenschein. | |
| ● Unbedeutender Regen. | |
| ● Unbedeutender Schnee. | |
| ●● Zeitweise Regen. | |
| ●● Zeitweise Schnee. | |
| ●● Anhaltend schwacher Regen. | |
| ●● Anhaltend Schneefall. | |
| ●● Anhaltend starker Regen. | } In current use. |

Regenmengen—24 Stunden.

- 1-5 mm.
 - 6-10 mm. (Seewarte map.)
 - 11-20 mm.
 - über 20 mm.
- In earlier use.

GREAT BRITAIN.

✉ Wireless messages.

INDIA.

Rain.

- (0 to 0.09 inch neglected.)
- 0.10 to 0.17 inch.
- ⊕ .18 to .37 inch.
- ⊕ .38 to .67 inch.
- ⊕ .68 to .87 inch.
- ① .88 to 1.24 inches.
- ⊕ 1.25 to 1.74 inches.
- ② 1.75 to 2.50 inches.
- ③ 2.51 to 3.49 inches.
- &c., &c.

ITALY.

≡ Piovoso.
⊗ Nebbioso.
△ Nevoso.

Cielo.

| $\frac{1}{4}$ coperto.
|| $\frac{1}{2}$ coperto.
/// $\frac{3}{4}$ coperto.
||| Tutto coperto.

Pioggia.

= da 0 a 5 mm.
≡ 5 a 15 mm.
≡ 15 a 30 mm
≡ oltre 30 mm.

JAPAN.

○ Clear.
⊗ Fair.
● Cloudy.
⊗ Snow.
◎ Fog.
● Thunderstorm.

NETHERLANDS.

Neerslag.

≡ 1-5 mm.
||| 6-10 mm.
■■■ meer dan 10 mm.

PORTUGAL.

⊗ Ennevoado.

ROMANIA.

Ploaia sau zăpada.

≡ 1-5 milimetri.
||| 6-10 milimetri.
peste 10 milimetri.

RUSSIA.

• Dozhd'. (Rain.)

SPAIN.

○ Despejado.
⊗ Con nubes.
⊖ Bruma.
⊗ Niebla.
⊗ Nieve.

SWEDEN.

≡ Regen.
□ Nebel.

These two symbols are given in W.J. van Beber's "Handbuch der ausübenden Witterungskunde," Stuttgart, 1886, 2.Teil, p.55.

SWITZERLAND.

• Regen. (Pluie.)

UNITED STATES.

R Rain.
S Snow.
⊗ Storm warnings.
cw Cold wave warning.
→⊕→ Storm track and location of storm center.

○ Fair. (Later ⊗.)
● Cloudy.
◎ Rain.
⊗ Snow.
● Heavy rain.
● Light rain.
⊗ Heavy snow.
⊗ Light snow.
○—□ Cautionary signal. (Later □ ○.)
○—■ Storm signal. (Later ■ ○.)
⊕ Cloudy.
⊗ Rain.
⊗ Snow.

In current use.

In earlier use.

C. SYMBOLS INDICATING THE STATE OF THE SEA.

ALGERIA AND FRANCE.

≡ Houleuse.
~~ or ≡ Grosse.

FRANCE.

• Calme.
.. Peu agitée.
.: Agitée.
:: Houleuse.
::: Grosse.
:::: Furieuse.

GREAT BRITAIN.

~~ Rough.
~~ High.

≡ Rough.
≡ High.

In current use.
In earlier use.

ITALY.

> Mosso.
» Agitato.
» Molto agitato.
» Grosso.
»» Tempestoso.

PORTUGAL.

~~ Estanhado.
~~ Plano.
~~ Chão.

~~ Po. agitado.
~~ Agitado.

~~ Pa. vaga.
~~ De vaga.

~~ Vaga grossa.
~~ Tempestuoso.
~~ Mto. tempestuoso.

SPAIN.

~~~	{ Llana. Rizada.
~	{ Marejadilla. Marejada.
~~~	{ Marejada gruesa. Gruesa.
~	{ Muy gruesa. Arbolada. Muy arbolada.

D. CLOUD SYMBOLS.

Ley, W. Clement. *Cloudland*. London. 1894. p. 26-27.

Scientific name.	English name.
≡ Nebula.	Fog.
≡≡ Nebula pulvrea.	Dust fog.
≡≡ Nebula stillans.	Wet fog.
== Nubes informis.	Scud.
= Stratus quietus.	Quiet cloud.
○ Stratus lenticularis.	Lenticular cloud.
≡ Stratus maculosus.	Mackerel cloud.
≡≡ Stratus castellatus.	Turret cloud.
≡≡ Stratus precipitans.	Plane shower.
○ Cumulo-rudimentum.	Rudiment.
▷ Cumulus.	Heap cloud.
▷ Cumulo-stratus.	Anvil cloud.
▷ Cumulo-nimbus.	Showeर cloud.
▷ Nimbus.	Rainfall cloud.
▷ Cumulo-stratus mammatus.	Tuberclod anvil cloud.
▷ Cumulo-nimbus grandineus.	Hail shower.
▷ Cumulo-nimbus nivosus.	Snow shower.
▷ Cumulo-nimbus mammatus.	Festooned shower cloud.
▷ Nimbus grandineus.	Hail-fall.
▷ Nimbus nivosus.	Snow-fall.
▷ Nubes fulgens.	Luminous cloud.
▷ Cirrus.	Curl cloud.
▷ Cirro-filum.	Gossamer cloud.
▷ Cirro-velum.	Veil cloud.
▷ Cirro-macula.	Speckle cloud.
▷ Cirro-velum mammatum.	Draped veil cloud.

Howard, Luke. On the modifications of clouds. London. 1803. p. 14. (Hellmann's "Neudrucke," No. 3, Berlin, 1894.)

＼ Cirrus.
○ Cumulus.
— Stratus.
▷ Cirro-eumulus.
＼ Cirro-stratus.
○ Cumulo-stratus.
○ Cirro-cumulo-stratus, or Nimbus.

Formerly used by Iowa Weather Service. (Adopted 1876.)

- ／ Cirrus.
- ／ Cirro-stratus.
- ／ Cirro-cumulus.
- ＼ Cumulus.
- ＼ Pallio-cirrus.
- ＼ Pallio-cumulus.
- ＼ Fracto-cumulus.

= Polar bands, drawn as placed across the sky with → indicating motion; thus ↗ bands NW-SE moving toward the east.

E. LITERAL SYMBOLS.

In addition to arbitrary symbols, numerous literal symbols—usually the initial letter or letters of meteorological terms in various languages—have been used in meteorological registers and on weather maps. Only a few of these are included in the foregoing lists. The rest lie beyond the scope of the present compilation.

ON THE COEFFICIENT OF CORRELATION AS A MEASURE OF RELATIONSHIP.

By CHARLES N. MOORE.

[Dated: University of Cincinnati, Department of Mathematics, Apr. 17, 1916.]

In recent years several applications of the theory of correlation have been made in connection with meteorological investigations.¹ Consequently a brief discussion of the significance of a correlation coefficient and its reliability as a measure of relationship may be of interest to readers of the MONTHLY WEATHER REVIEW. The theoretical discussion in the present paper is in substance the same as that given by the writer in a recent paper in Science.² The bearing of that discussion on applications in meteorology is given here for the first time.

The theory of correlation deals with the relationship between two variable quantities whose variations are due in part or entirely to common causes. A certain quantity, r , known as a coefficient of correlation, is computed, and from its value inferences are drawn as to the extent to which the variations of the two quantities are affected in the same way by the same causes, or as to the extent to which the variation of one quantity affects that of the other.

The formula for r in terms of n pairs of observed values of two variables x and y , is

$$r = \frac{\sum_{i=1}^{i=n} (x_i - x_0)(y_i - y_0)}{\sqrt{\sum_{i=1}^{i=n} (x_i - x_0)^2 \cdot \sum_{i=1}^{i=n} (y_i - y_0)^2}}, \quad (1)$$

where x_0 is the mean of the x values and y_0 the mean of the y values.³ The value of r obtained from this formula

¹ See J. Warren Smith in MONTHLY WEATHER REVIEW, February, 1914, 42:78; and ibid., 1915, 43:222.

² A. Sresnický, in Meteorologische Zeitschrift, Braunschweig, December, 1914, 31: 506.

³ L. Steiner, in Meteorologische Zeitschrift, Braunschweig, September, 1915, 32: 419.

⁴ Chas. N. Moore, "On the coefficient of correlation as a measure of relationship," Science, New York, October 22, 1915 (NS), 42:575-579.

⁵ For an account of the process of computing r from a table of observed values of two variables see the paper by J. Warren Smith, MONTHLY WEATHER REVIEW, February, 1914, 42:79-80.